

USDA Satellite Imagery Archive

December 5, 2011

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USDA' s Satellite Imagery Archive (SIA) FY11/FY12 Update

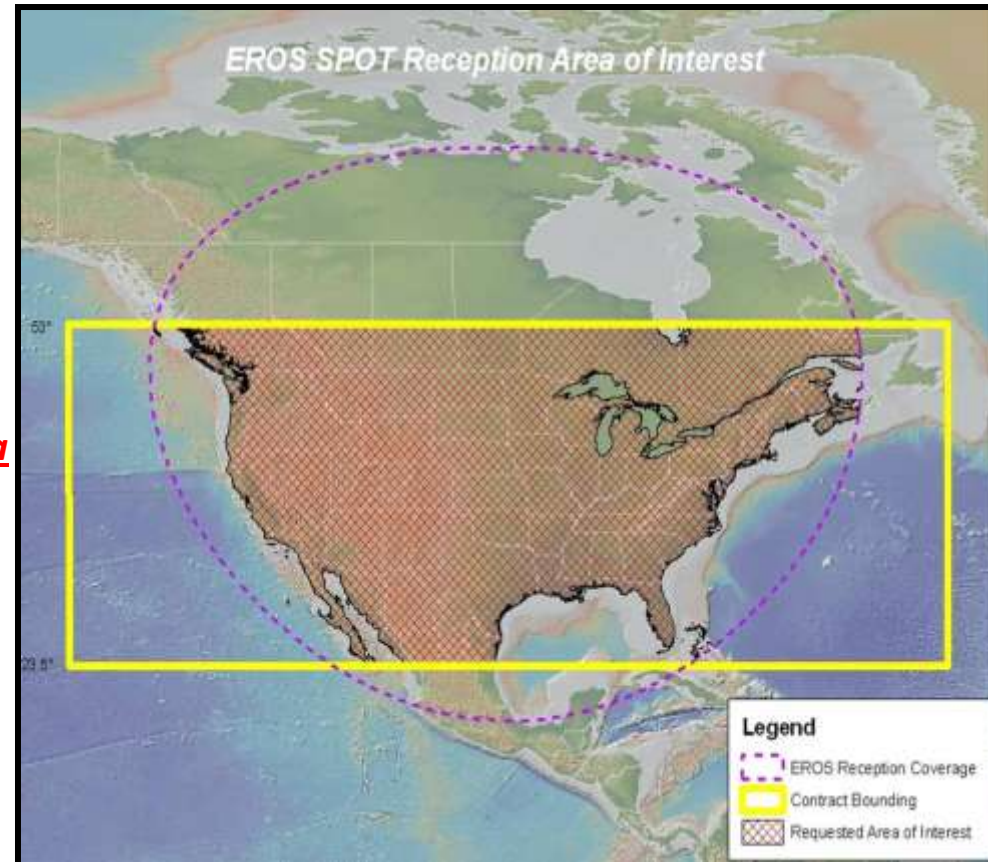
SIA supported two satellite imagery contracts with **four satellites** covering the conterminous US:

- a)* **SPOT 4** (20-meter) & **SPOT-5** (10-meter) imagery from Dec. 26, 2009 – Dec. 25, 2011 via the 2011 USGS-SPOT North America Data Buy (NADB) contract.

- b)* **Deimos-1** & **UK-DMC2** (22-meter) imagery from April 4-18th; and May 1-Oct. 31, 2011 via the USDA/FAS SPOT-Astrium contract.

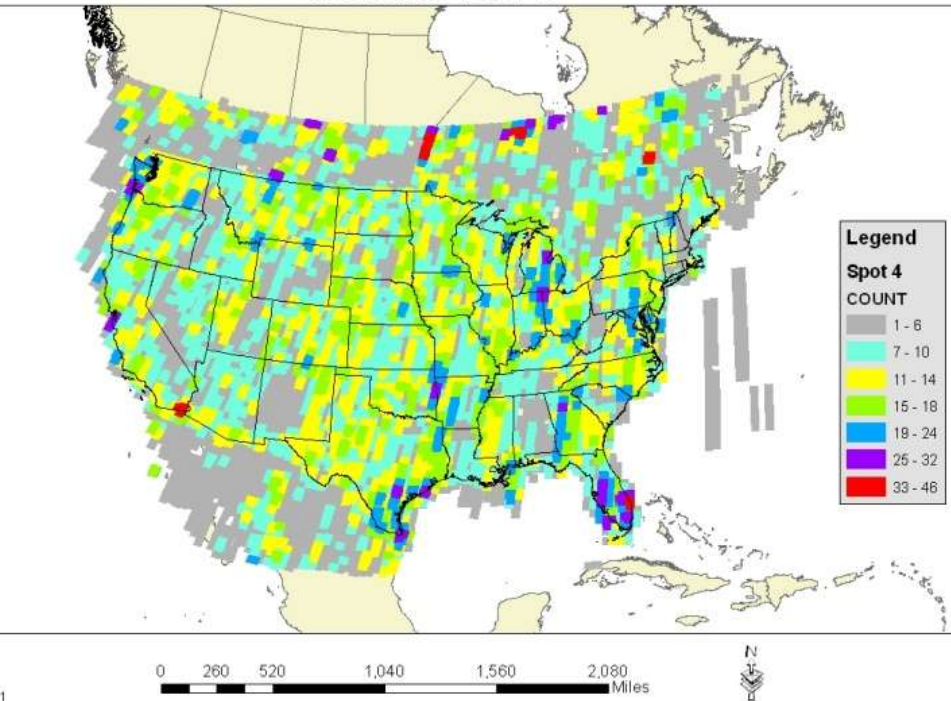
USGS-SPOT North America Data Buy (NADB)

- SPOT ground receiving station at USGS-Sioux Falls, SD
- Year 2 of USGS-SPOT contract will end on December 27, 2011:
 $\$1,750,000/130,000 \approx \underline{\$14/\text{image}}$
- *Year 2 SIA contribution funded the creation of a automated SPOT orthorectification by USGS*

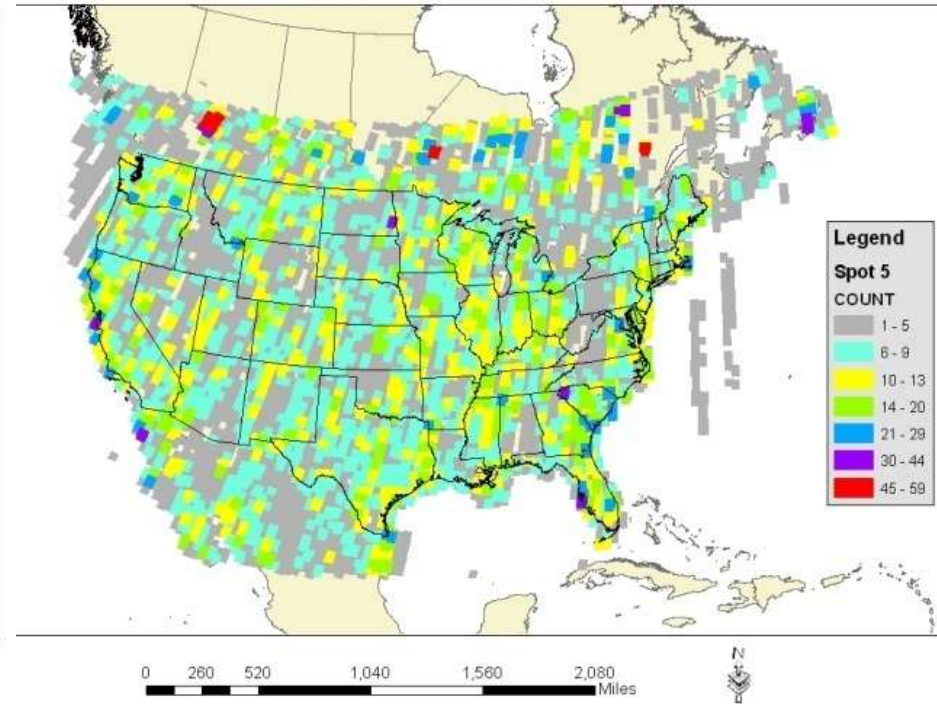


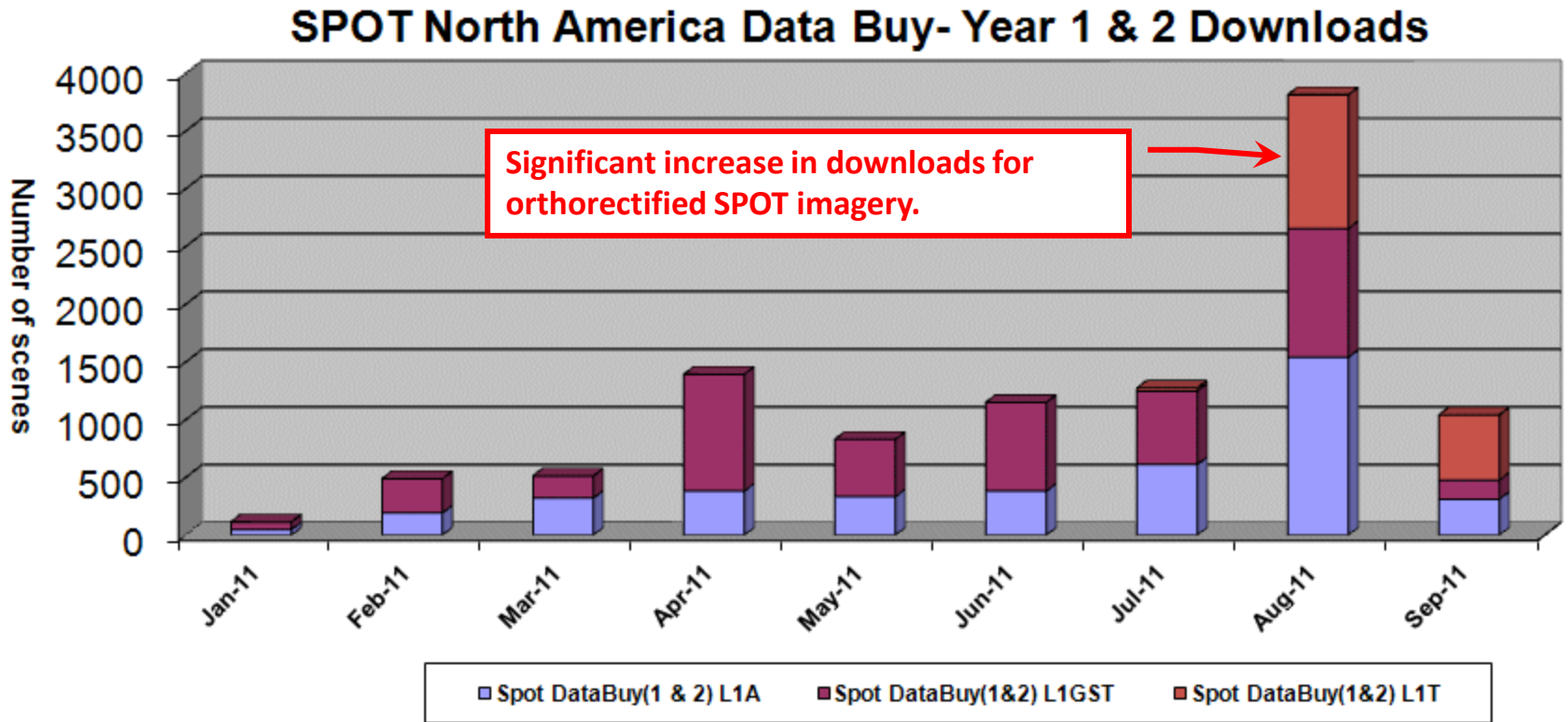
SPOT-4/5 Images in Earth Explorer

Final USGS SPOT-4 Databuy Coverage by Count
Contract Year 1



Final USGS SPOT-5 Databuy Coverage by Count
Contract Year 1

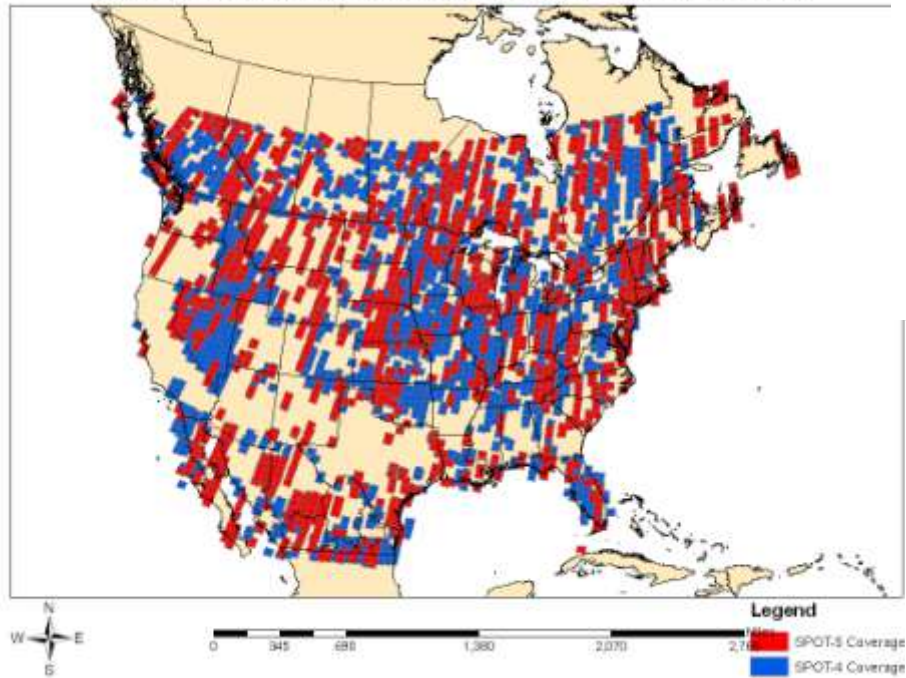




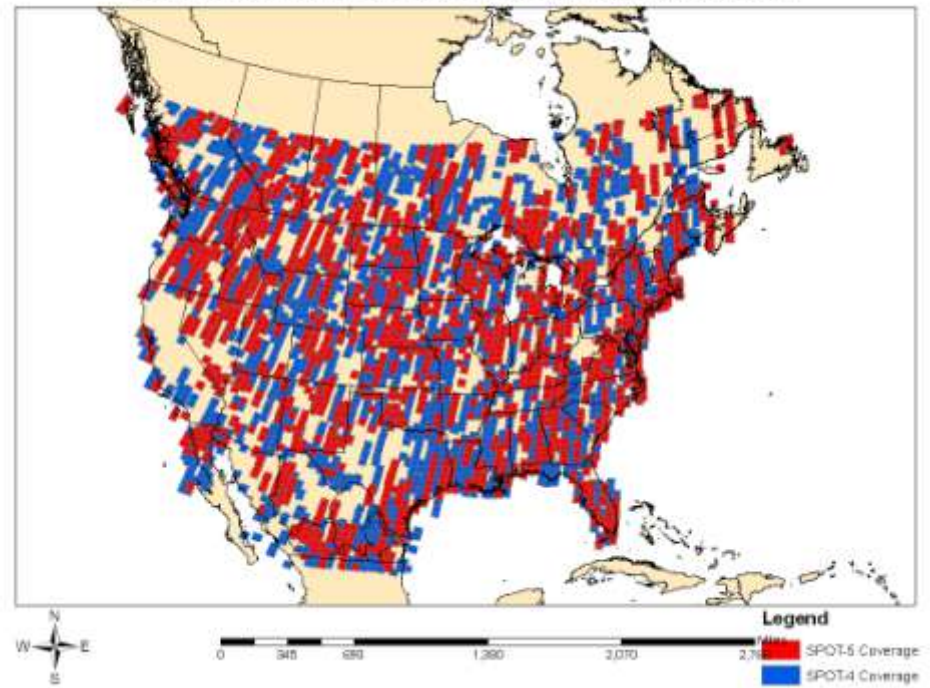
- In Aug 2011, all SPOT-4/5 images cloud-free (<30% clouds or ~70,000 images) were orthorectified by USGS!!
 - SPOT Level 1A = Level 1A (USGS/Landsat) = Minimally corrected
 - SPOT Level 2A = Level 1Gst (USGS/Landsat) = Georegistered
 - **SPOT Level 3A= Level 1T (USGS/Landsat) = Orthorectification**

Year 2 Coverage by Month

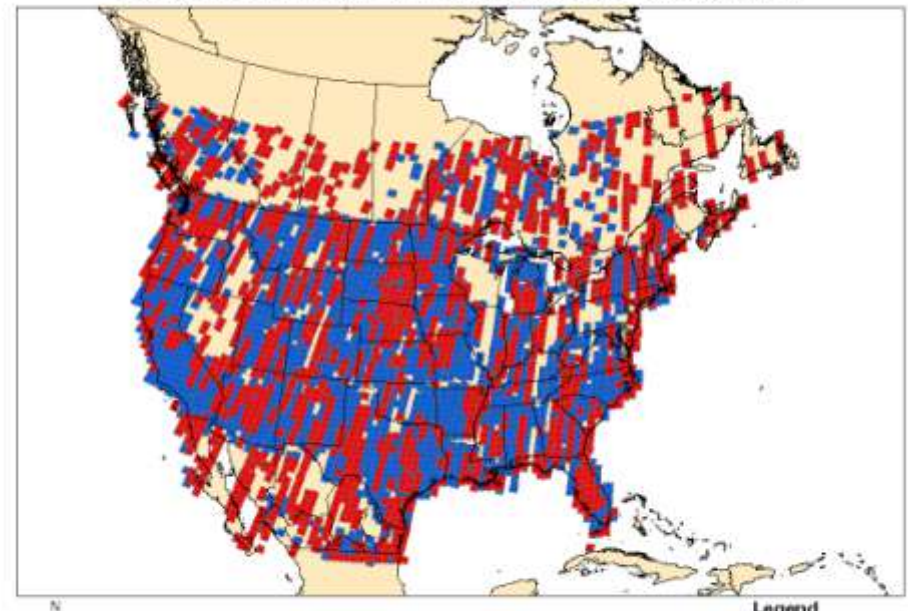
USGS SPOT Databuy Contract 2 Coverage - September 2011



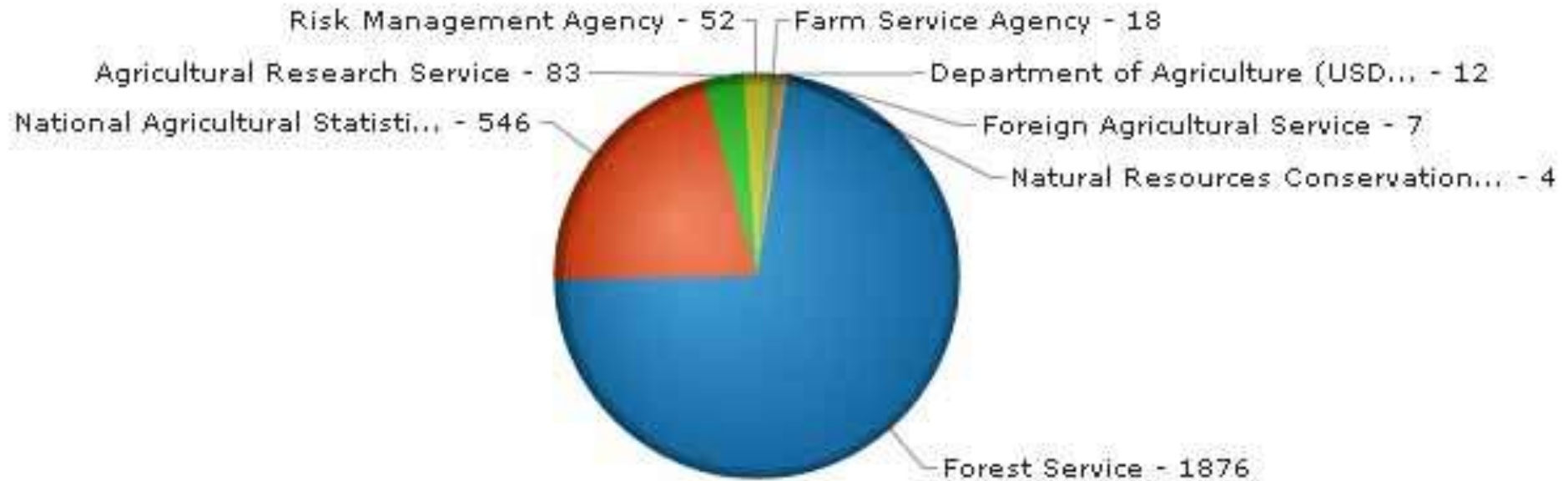
USGS SPOT Databuy Contract 2 Coverage - August 2011



USGS SPOT Databuy Contract 2 Coverage - October 2011



Jan 2011 thru Oct 2011 Download USDA Distribution - Contract Year 1 Data

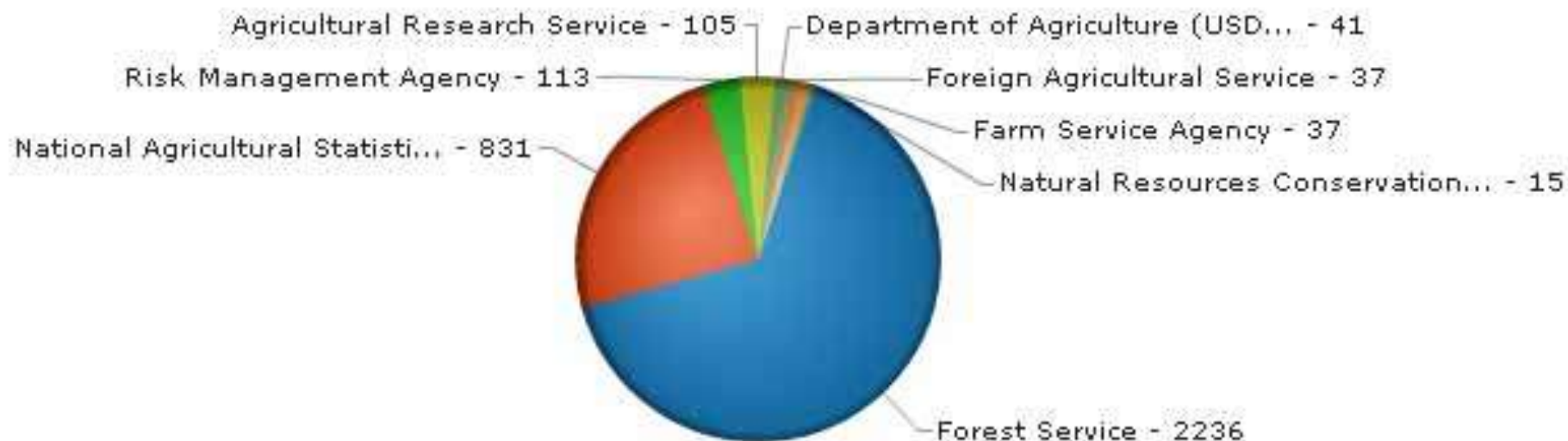


Contract Year 1 Imagery = 12/26/2009 to 12/27/2010

SPOT 4 = 38,770 scenes + SPOT 5 = 28,117 scenes = **66,887** scenes

USDA Downloads 2,600 scenes

Jan 2011 thru Oct 2011 Download USDA Distribution - Contract Year 2 Data



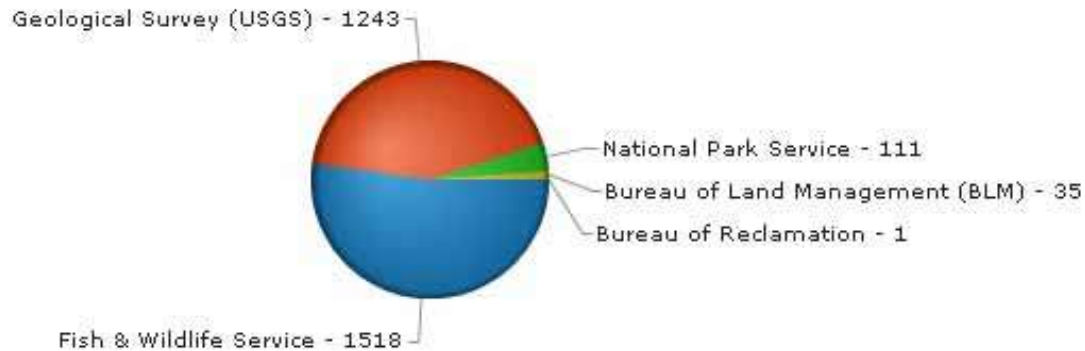
Contract Year 2 imagery Graphed = 1/1/2011 to 10/31/2011

Contract Period ongoing until 12/15/2011

Total Available: SPOT 4 = 38,416 + SPOT 5 = 31,356 = **69,772** scenes

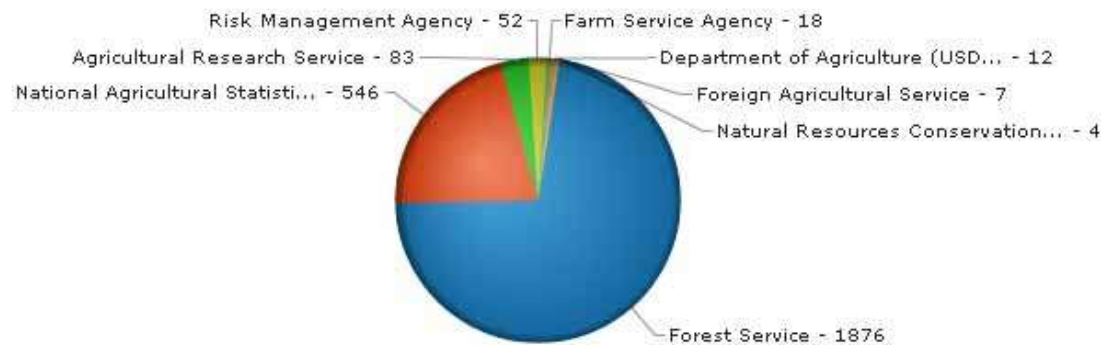
USDA Downloads 3,415 scenes

Jan 2011 thru Sep 2011 Download DOI Distribution - Contract Year 1 Data



USDA use < DOI use
2600 to 2908

Jan 2011 thru Oct 2011 Download USDA Distribution - Contract Year 1 Data

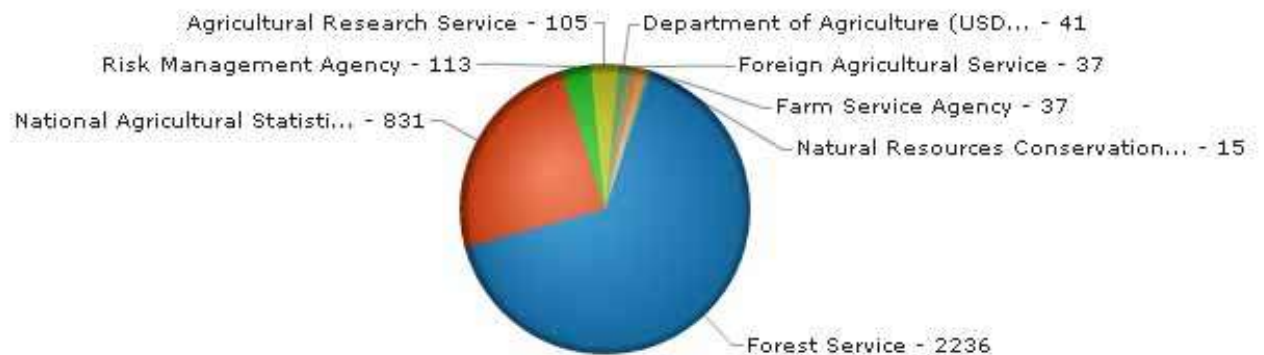


Jan 2011 thru Sep 2011 Download DOI Distribution - Contract Year 2 Data

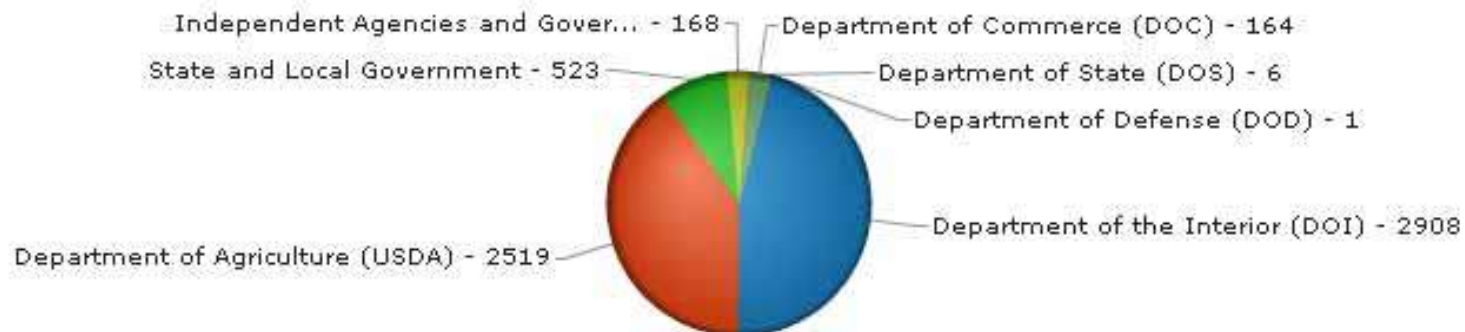


USDA use > DOI use
FS use > DOI use

Jan 2011 thru Oct 2011 Download USDA Distribution - Contract Year 2 Data

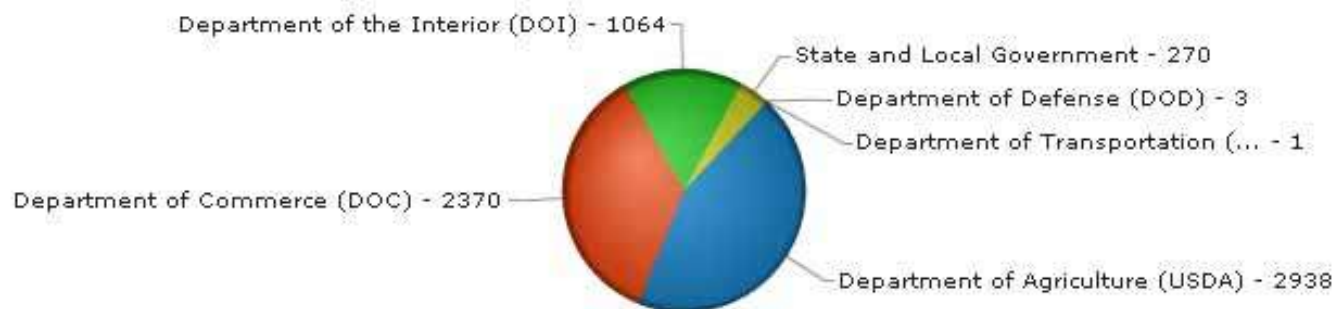


Jan 2011 thru Sep 2011 Download Distribution By Organization - Contract Year 1 Data



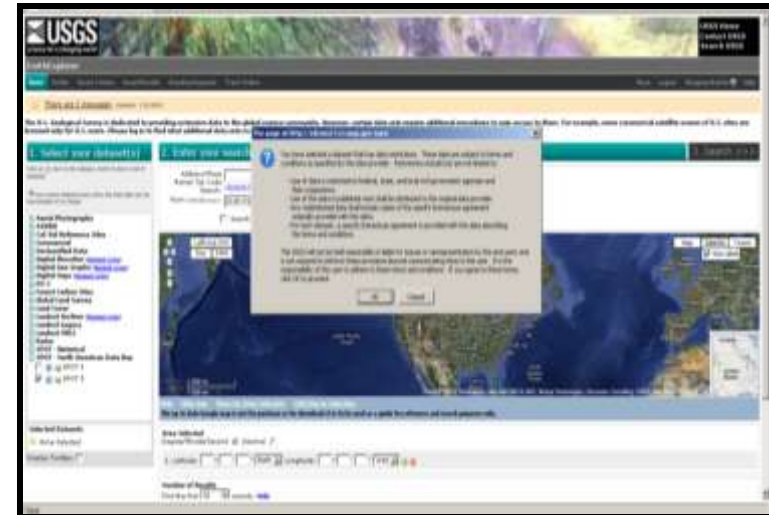
Jan 2011 thru Sep 2011 Download Distribution By Organization - Contract Year 2 Data

* DOD = COE



2010/11 SPOT-4/5 Imagery Available at USGS Earth Explorer

- 2011 SPOT-4/5 imagery (>100,000 images) at <http://earthexplorer.usgs.gov> & available to US Federal civil, state, and local government users.
- SPOT-4/5 imagery distributed as:
 - Level 1A = SPOT Level 1A
 - Level 1Gst = SPOT Level 2A
 - Level 1T = SPOT Level 3A= Orthorectification



Using Deimos-1 & UK-DMC2 to Monitor US Crop Conditions During the 2011 Crop Season



Drew Hopwood

November 15, 2011

All the space you need



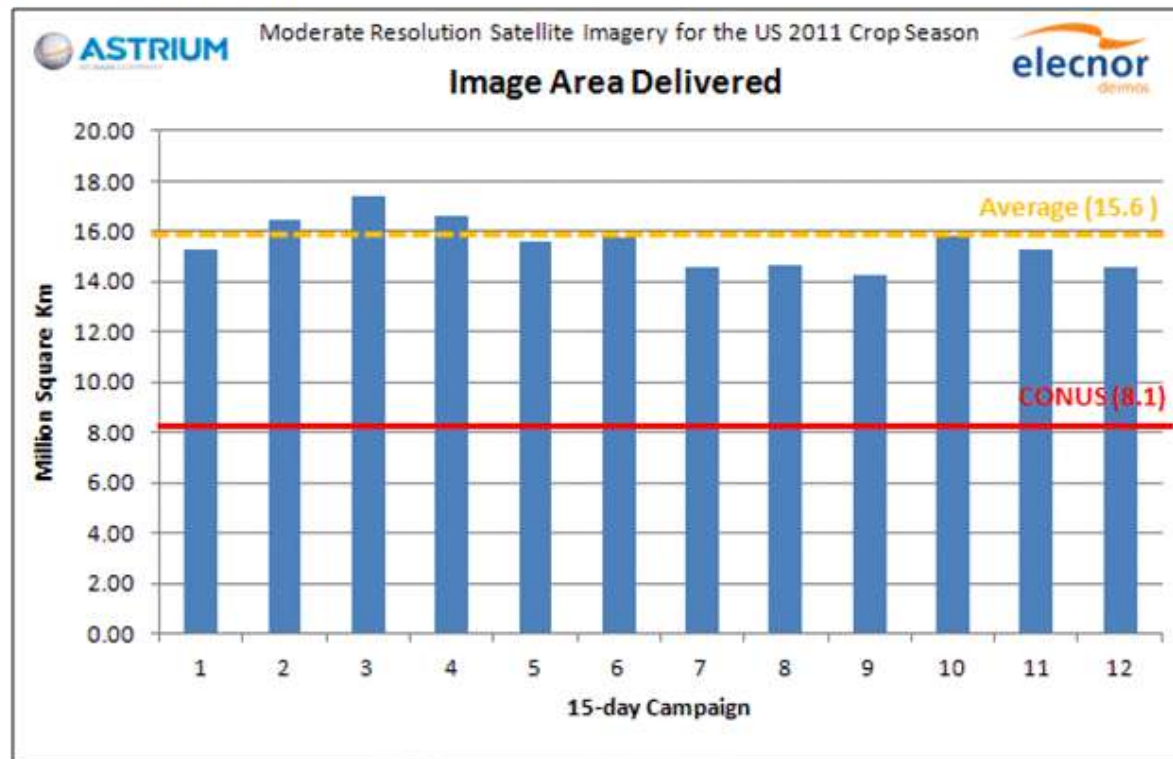
Collection

- Two 15 day collection campaigns per month
 - 12 collection campaigns for the project
- Deimos-1 used for primary collection
 - UK-DMC2 used to fill gap and recollect cloudy areas
 - Collection distribution was 80% Deimos-1, 20% UK-DMC2



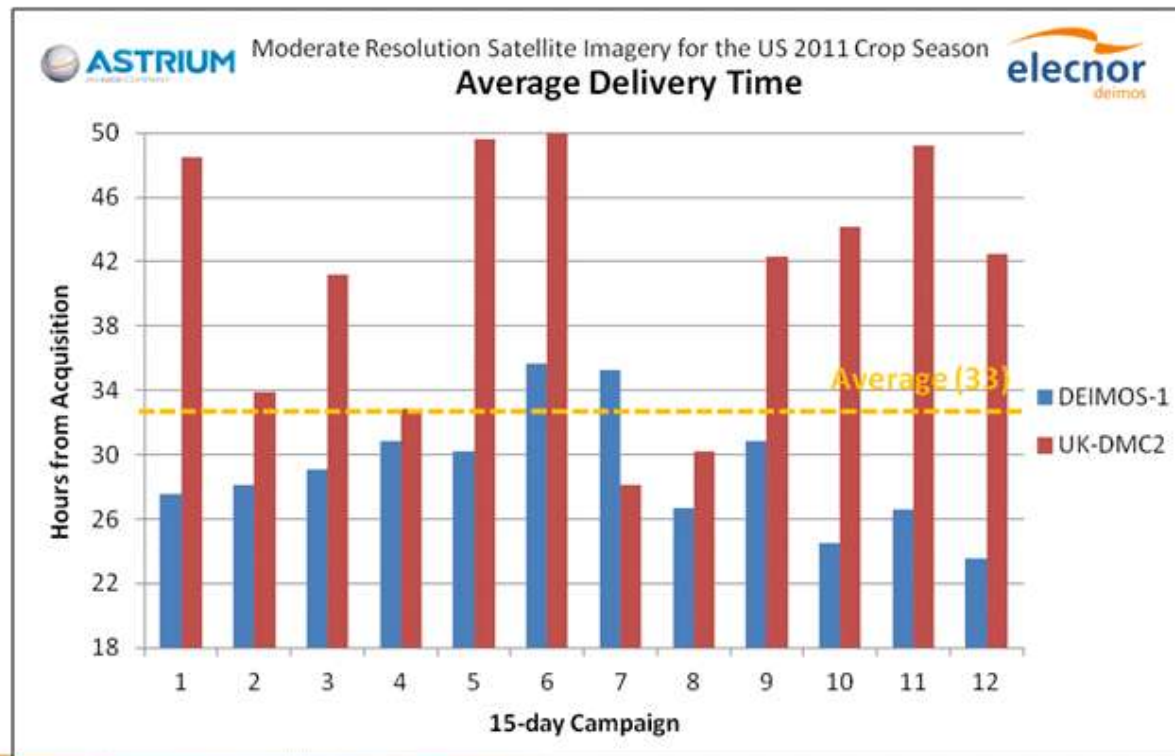
Collection Results

- Astrium delivered more than 186M km² of data to the USDA
 - 150M km² of cloud-free data
 - = 3.1 repeat coverage per month = 150/(8.1*6-months)**
- On average 15.6M km² of imagery was delivered every 15 days
 - CONUS is 8.1M km²



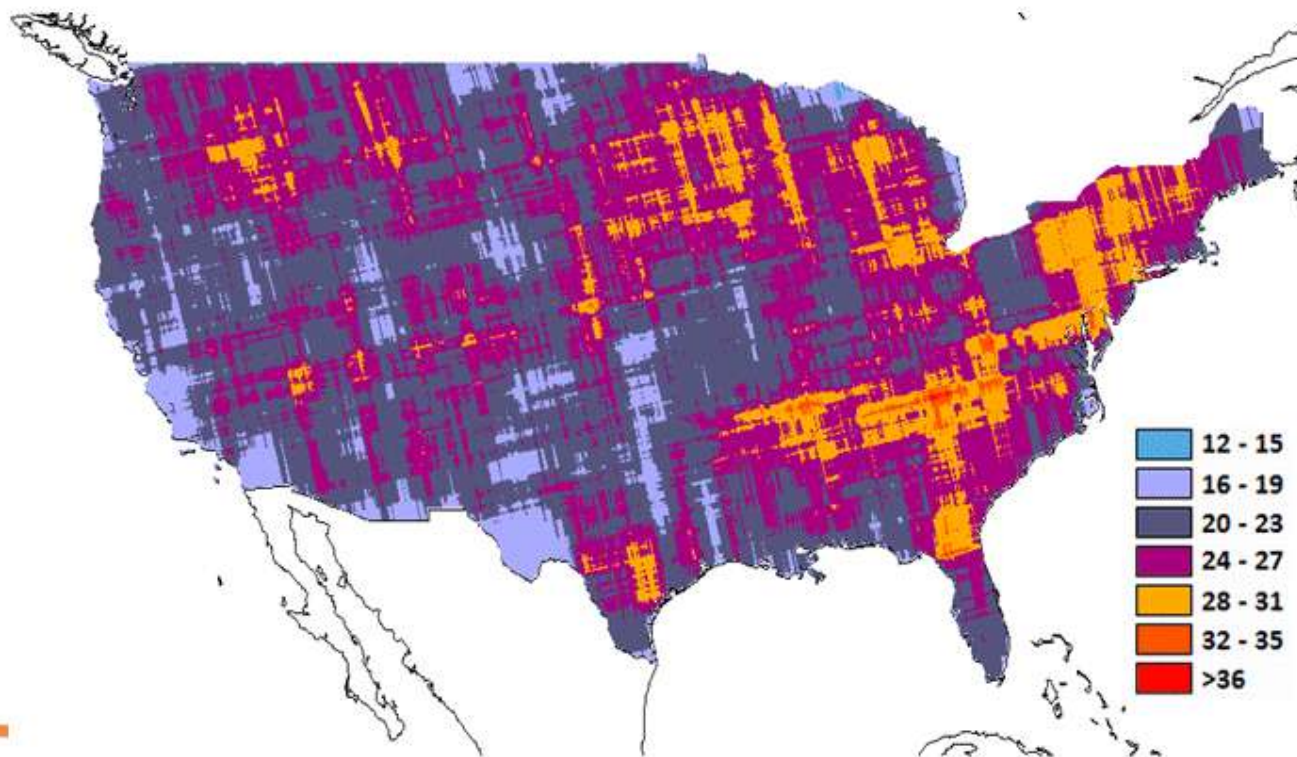
Data Delivery

- Averages delivery time was 33 hours from acquisition
 - Deimos-1 Data – 29 hours
 - UK-DMC2 Data – 41 hours
- Only 4 images out of 1462 exceeded 72 hours



Temporal Coverage

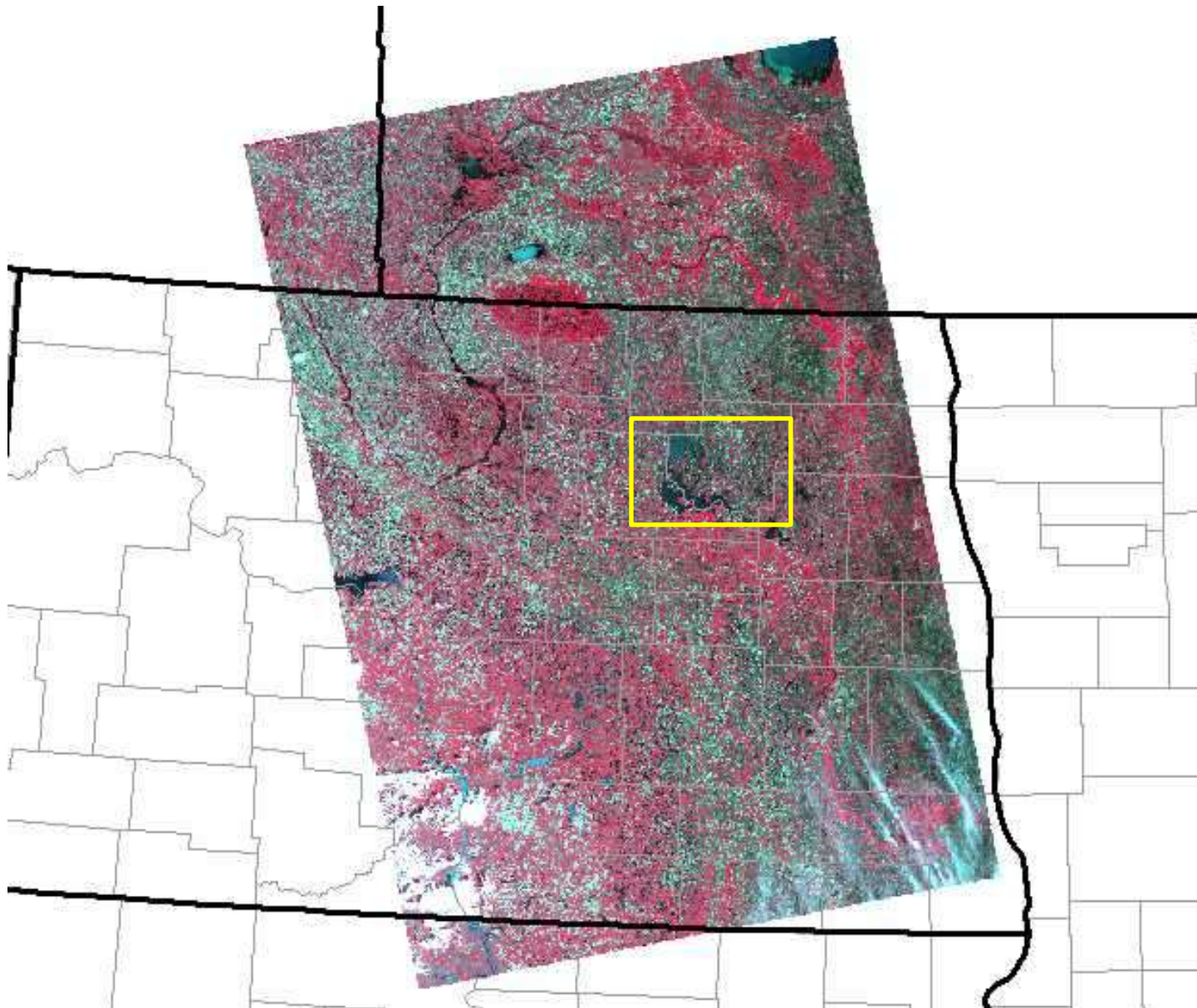
- Maximum coverage 36 times
- 100% - covered 12 times
- 45% - covered 20 -23 times



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Deimos-1 June 18, 2011



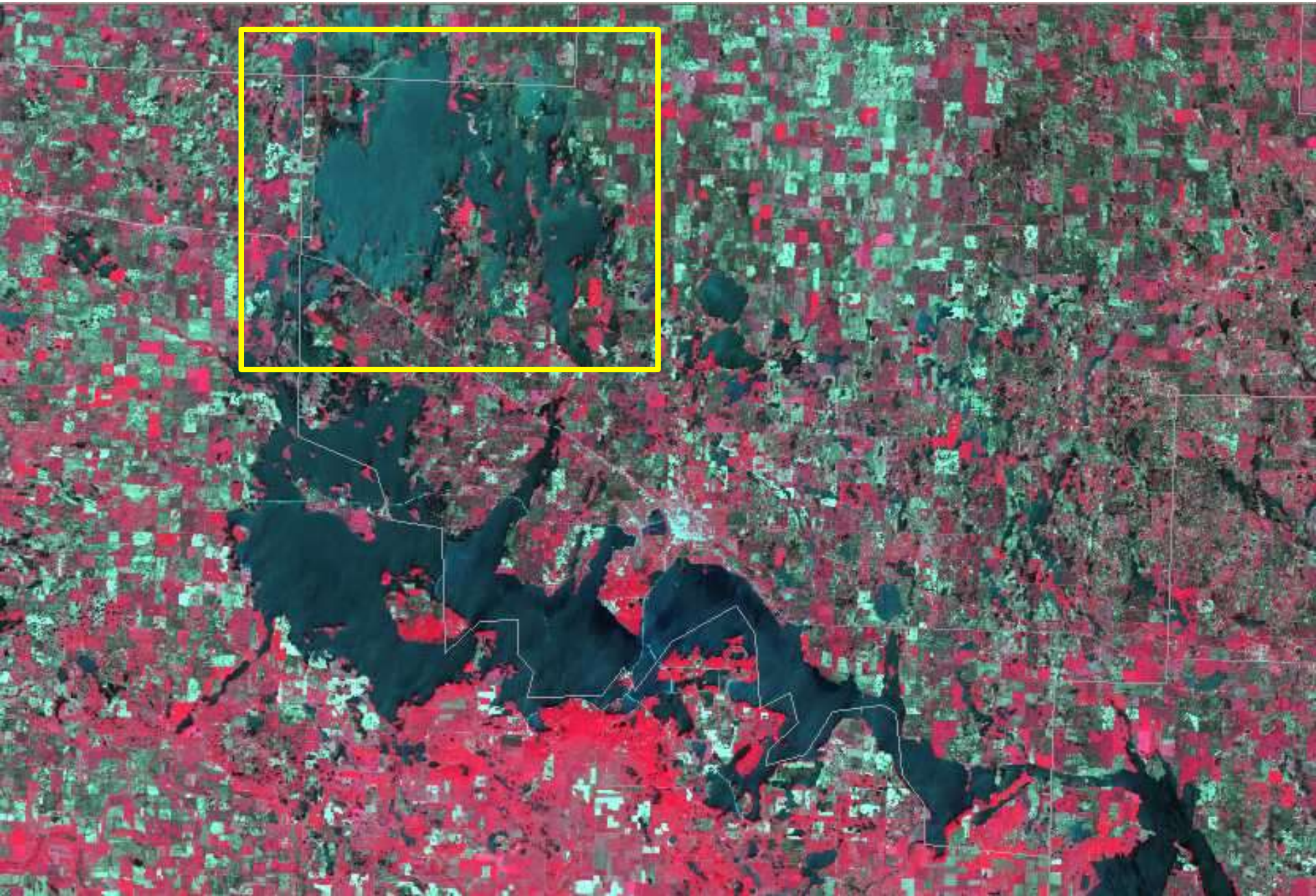
Devils Lake



Devils Lake



Devils Lake





22 Meter Deimos-1





22 Meter Deimos-1



Side by Side Comparison



	Deimos/UK2	Landsat 5
Launch Date	2009	1984
Resolution	22 meters	30 meters
Spectral Bands	B2: 0.52 – 0.60 B3: 0.63 – 0.69 B4: 0.77 – 0.90 (Green, Red, NIR) 3 bands total	B2: 0.52 – 0.60 B3: 0.63 – 0.69 B4: 0.75 – 0.90 B5: 1.55 – 1.75 (Green, Red, NIR, SWIR) 7 bands total
Swath Width	600 kilometers	185 kilometers
Revisit Rate	4 Days	16 Days



Deimos/DMC-UK2 Contract closed on October 31, 2011

- Comments from Rick Mueller from NASS-Fairfax:
- With Landsat-5 not in operation next year, it is critical for NASS to receive DMC imagery for the 2012 US crop season (April 1- Sept 30).
- “I would like to thank [ElecNor] for the excellent service that you’ve provided to us this year! We really appreciate the timely delivery of data, the quality of data, and of course the volume of data! Your program has made a tremendous impact on our national acreage and regional yield monitoring programs this year, and helped us improve our ag statistical estimates! Again, thanks for your service and I hope we are able to do business again real soon!”

USGS Contract Year 3 for North American Data Buy (NADB)

- USGS have been able to arrange for a "bridge contract" that would potentially allow for us to continue our efforts that began approximately 2 years ago and also add coverage for AK and HI as well as US territorial waters (out 12 miles on a limited basis).
- The bridge would cover the period from December 16, 2011 through June 30, 2012. The reason for the bridge is that there is not sufficient time to get a competitive contract in place and awarded by the end of the calendar year and with Landsat 5 experiencing problems, we are trying to ensure that we have some form of near-continuous EO coverage over North America plus Hawaii.
- A couple of modifications to previous delivery order requests: 1) we are asking for an expanded license which would allow for FedCiv to share with project partners; 2) we are asking for up to 50,000 square kms per month of potential (U.S.) coastal collects on an as needed basis.

USGS Contract Year 3 for North American Data Buy (NADB)

- Estimating that the bridge contract covering the 6 1/2 month period described above will need approximately \$800K to carry out (which would include the optional AK/HI AOI

USGS Contract Year 3 for North American Data Buy (NADB)

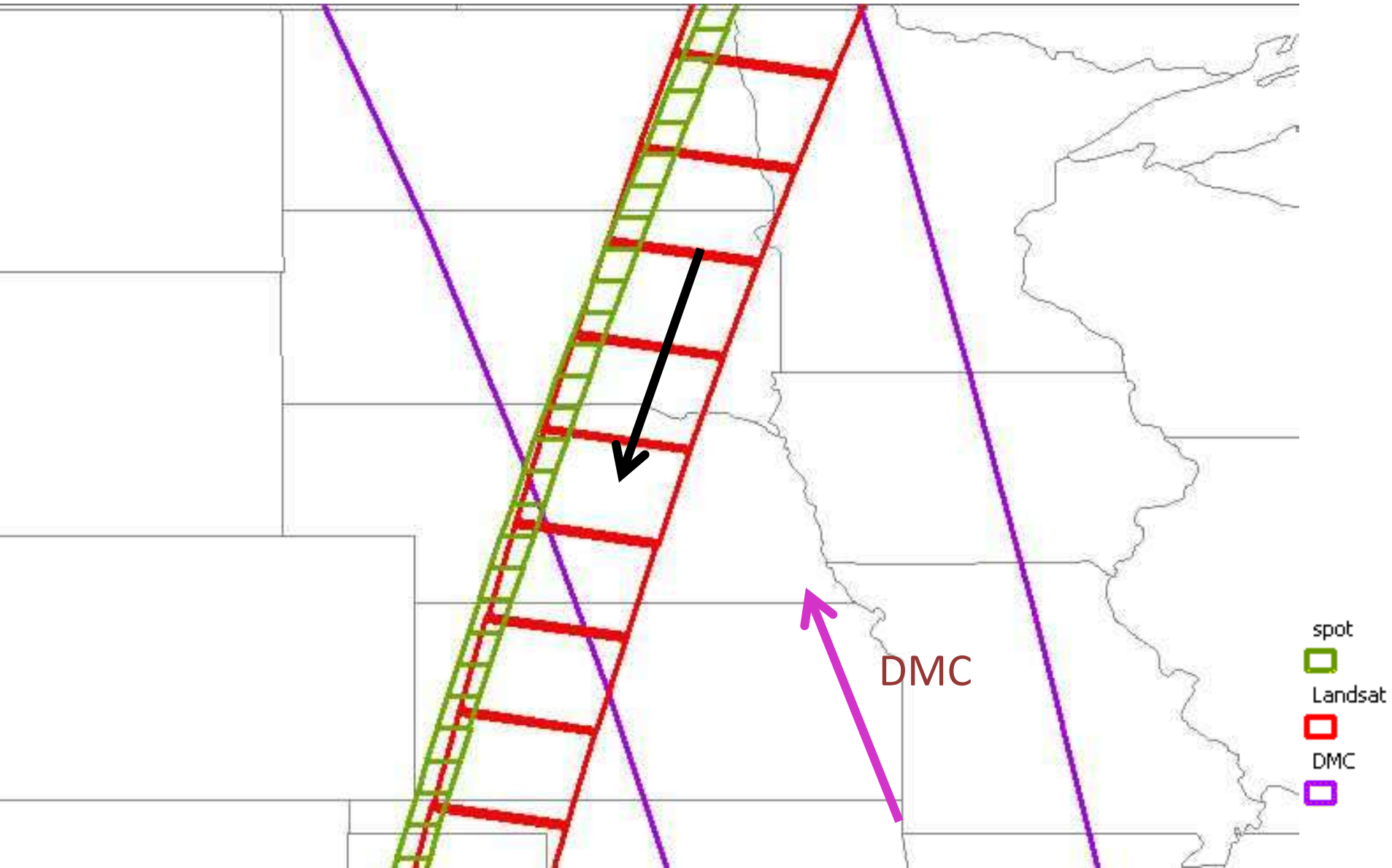
- USDA's SIA contributed \$300,000/year towards the SPOT-USGS contract for the past two-years.
 - Avg. SPOT Image = \$1.75M/130,000-images=~**\$13.46/image**
- Based on above cost savings, USDA-SIA members recommend \$300k to be contributed towards USGS Contract Year 3 NADB.

USDA Satellite Imagery Archive (SIA)

Why SIA?

- SIA originally was created to share Landsat imagery FAS purchasing with other USDA Agencies. Landsat costs ranged from \$3000 to \$500 per image.
- Until Landsat became available for Free, USDA was the largest user of Landsat.
- FAS has purchased AWiFS, SPOT, and DMC imagery for USDA use and provides access to image Archive.
- A purchase once, use many times implementation that has lasted over 15 years!

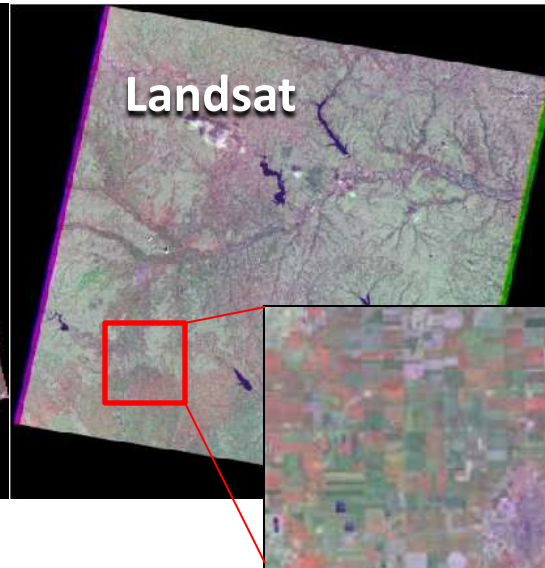
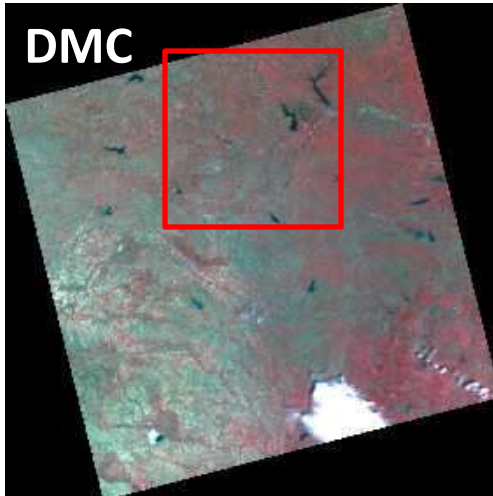
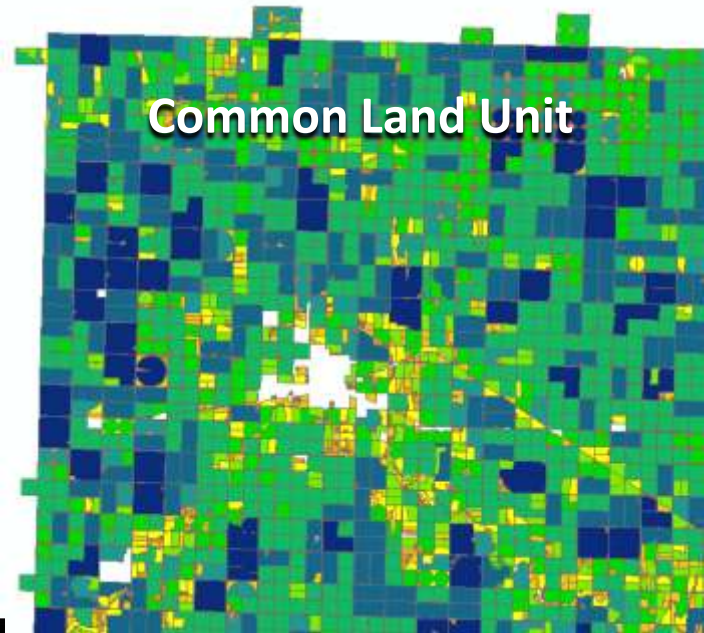
DMC, SPOT, and Landsat Swaths



Farm Service Agency

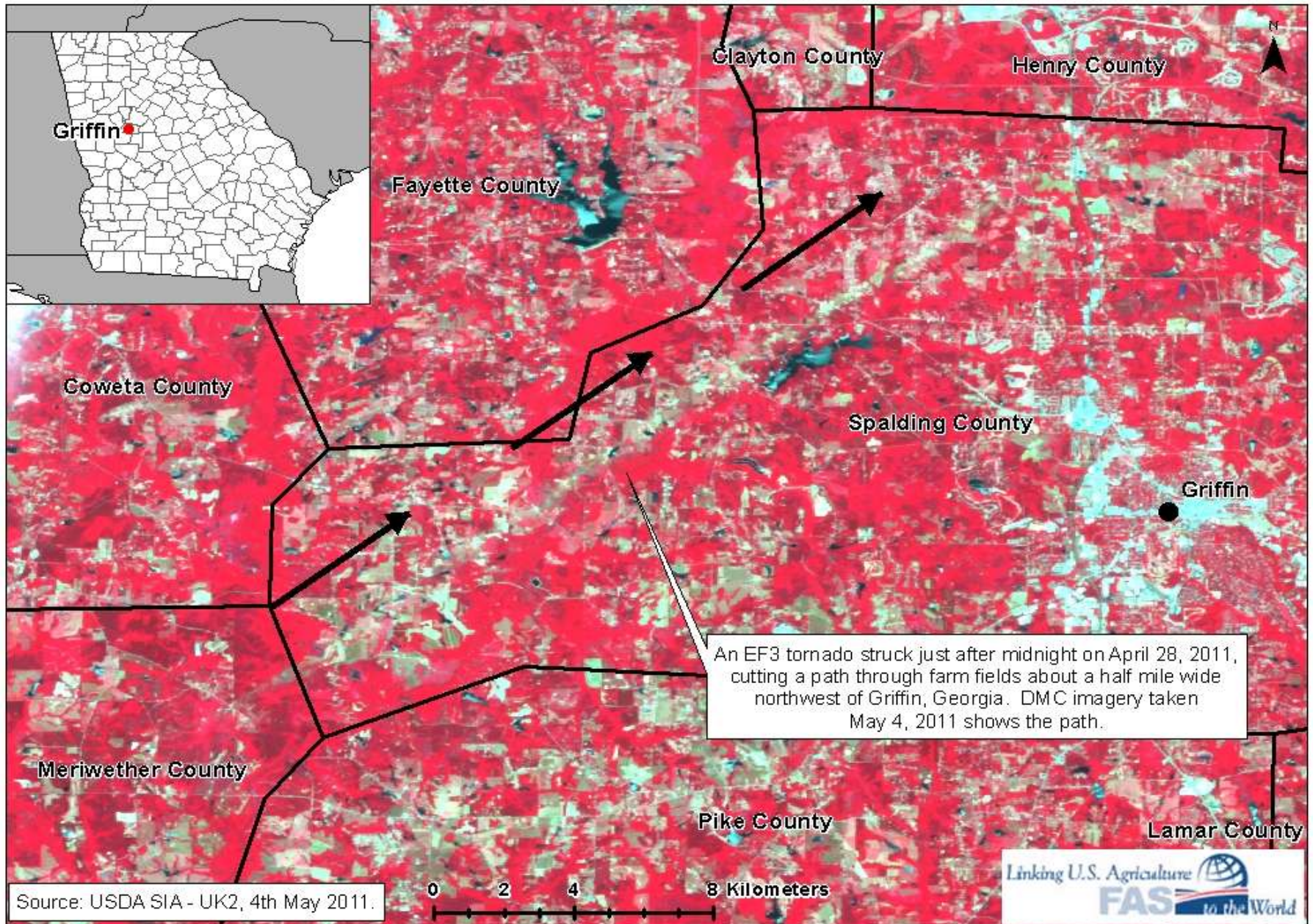
“FSA in conjunction with FAS uses remote sensing to provide an early warning of potential domestic crop disasters. FSA uses aerial photography and satellite imagery to map farm fields and to monitor compliance with farm program rules.”
(http://www.usda.gov/oce/remote_sensing/index.htm)

“Nearly all FSA programs are related to individual farms and tracts of land, the backbone of effective program delivery is the use of GIS fully integrated with up-to-date imagery and digital land and program data... FSA has used remote sensing data to create and maintain the Common Land Unit,”
(http://www.usda.gov/oce/remote_sensing/activities.htm)



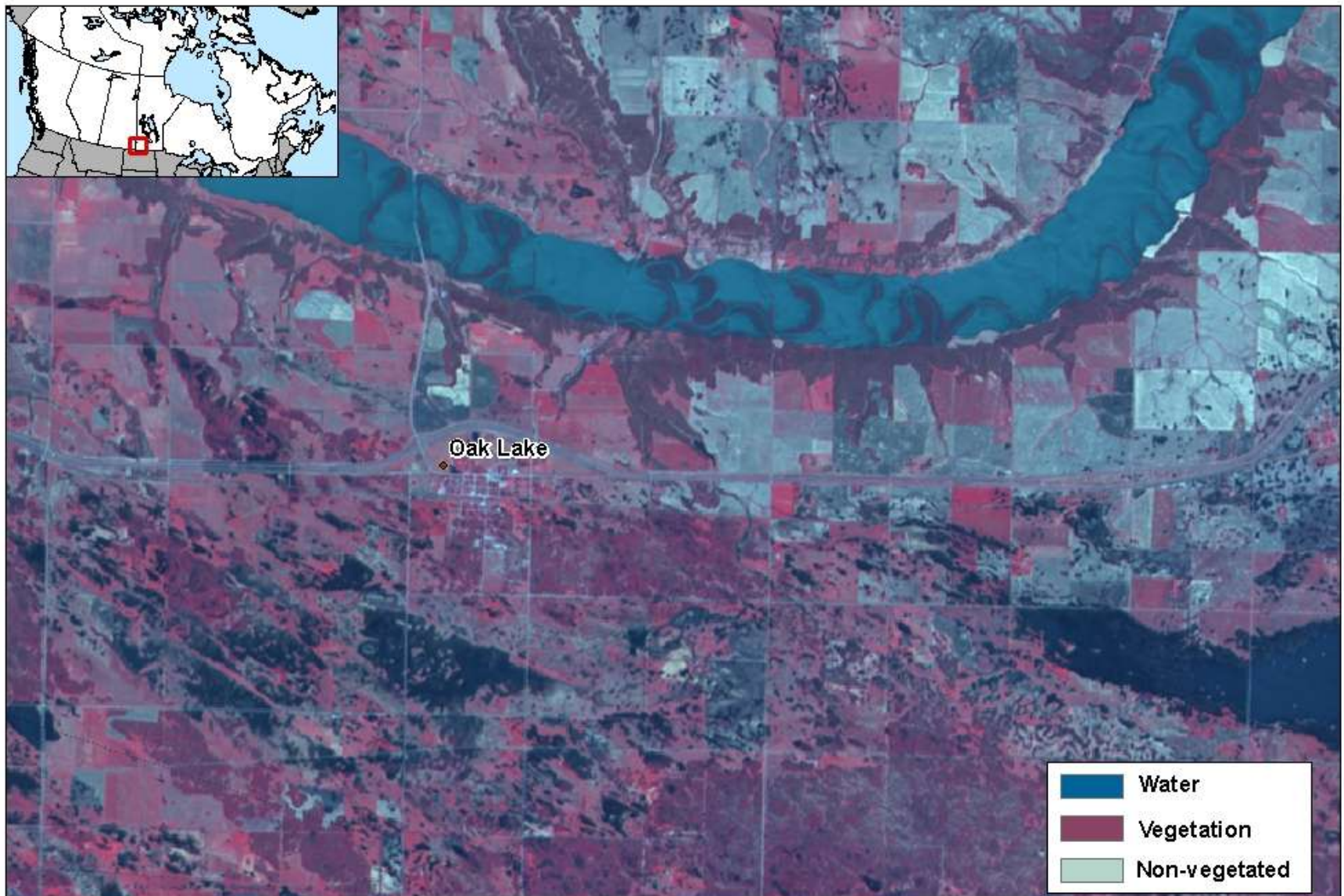
Farm Service Agency

Path of Tornado near Griffin, Georgia (Spring 2011)



Foreign Agriculture Service

Spring Flooding near Oak Lake, Manitoba, Canada (18 May 2011)



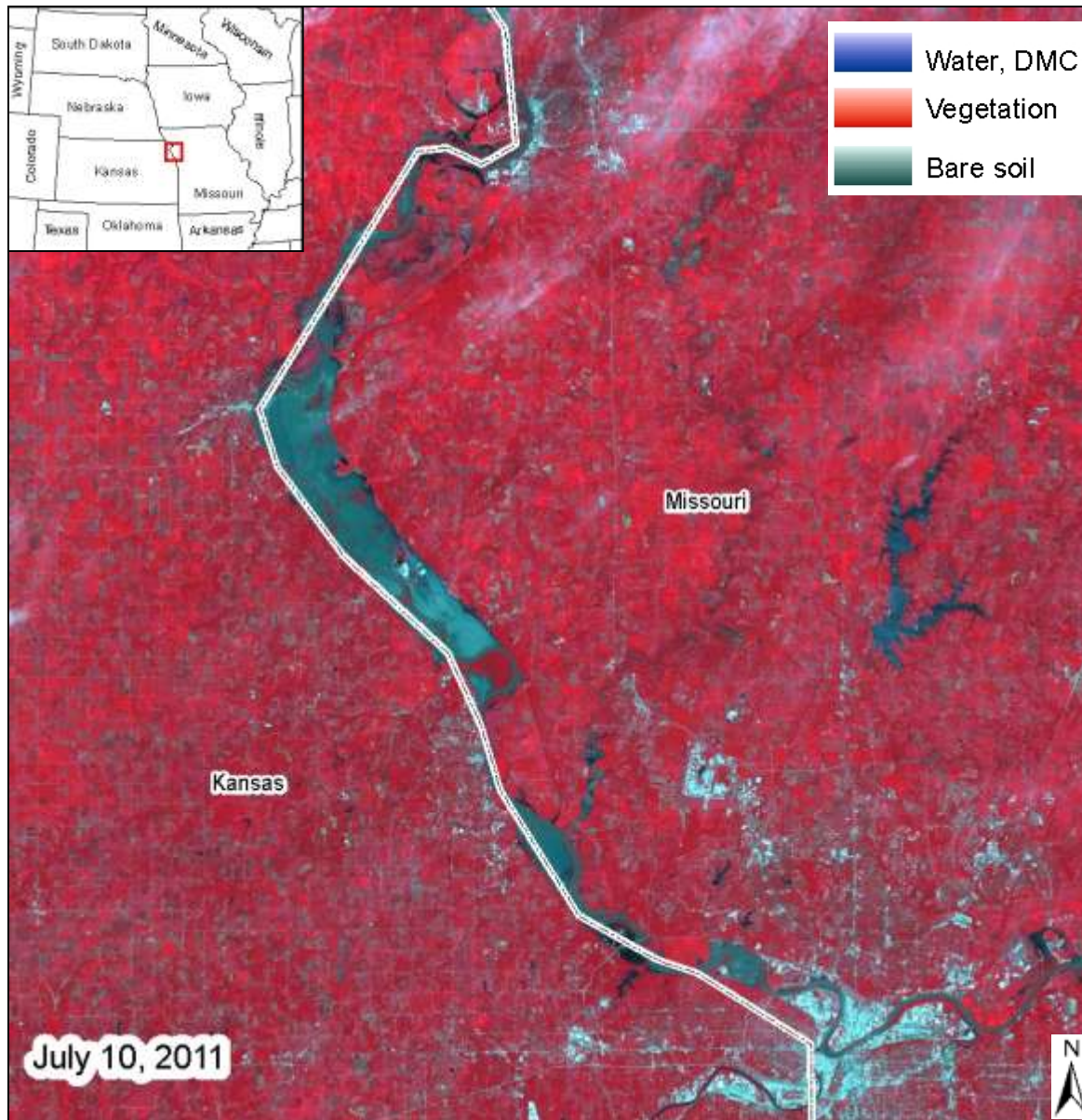
Source: USDA Satellite Imagery Archive
SPOT 4 K566 J249 and 250, 18 May, 2011

0 0.5 1 2 Kilometers

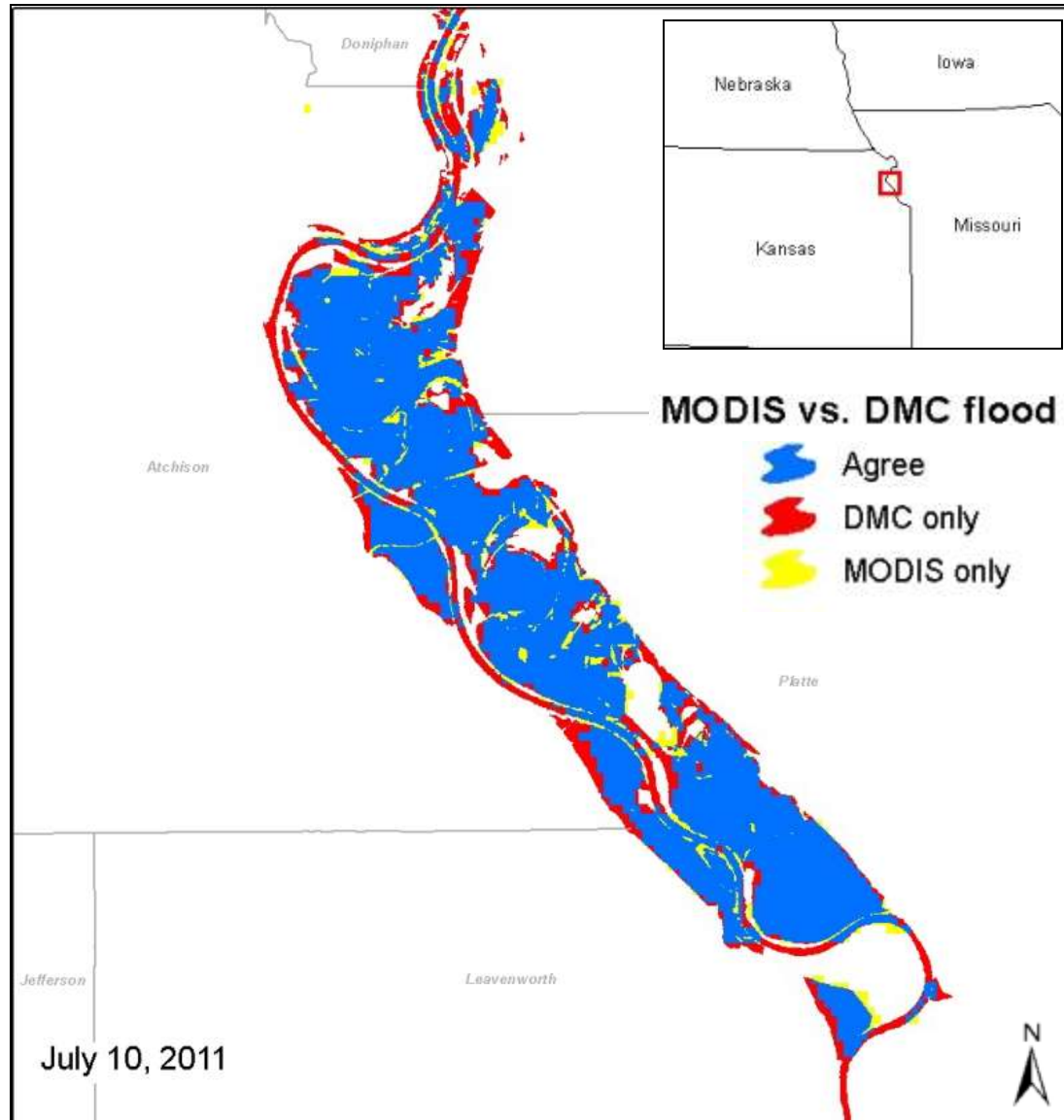


Linking U.S. Agriculture 
FAS to the World

Risk Management Agency



Risk Management Agency



Wallow Fire – Apache National Forest, Arizona

Deimos, May 25, 2011



Deimos, June 13, 2011

June 4, 2011

Post wildfire mapping and vegetation recovery monitoring

Forest Service / APHIS Mountain Pine Beetle Monitoring

Mountain Pine Beetle



Image: Pine Beetle Damage,
Canada ; Dezene Huber



SPOT 5 visualization of Pine Beetle infestation
Helena National Forest, Montana